Amendments to the Claims

Claims 1-19 (cancelled)

20. (currently amended) A machine having one or more internal components coated with a thermal barrier coating having sufficient thickness and thermal and structural properties as to form an effective barrier between the one or more components and an extreme environment such as an interior of a gas turbine engine, the thermal barrier coating comprising a mixture of at least a refractory material and an indicator material having an optical emission spectrum which varies in response to a temperature of the respective component, wherein the machine ~~comprising~~ comprises:

a light source for directing an interrogating light beam onto the one or more components;

a light collector for collecting light from the one or more components; and

an analyzer for detecting at least a temperature of the one or more components by analysis of light collected from the one or more components.

21. (previously presented) The machine according to claim 20, wherein the one or more components is coated with one or more priming layers over which the thermal barrier coating is coated.

22. (previously presented) The machine according to claim 20, wherein the indicator material has an optical emission spectrum which varies in response to at least one other physical parameter of the respective component, and the analyzer is configured to detect the at least one other physical parameter of the one or more components by analysis of light collected from the one or more components.

23. (previously presented) The machine according to claim 22, wherein the indicator material has an optical emission spectrum which varies in response to at least one physical parameter selected from the group consisting of a physical strain applied to at least a region of the one or more components, erosion of at least a region of the

one or more components, and a physical stress of at least a region of the one or more components.

24. (previously presented) The machine according to claim 20, wherein the refractory material is selected from the group consisting of yttria stabilised zirconia, yttria partially stabilised zirconia, and yttria aluminum garnet.

25. (previously presented) The machine according to claim 20, wherein the indicator material is a phosphor material.

26. (previously presented) The machine according to claim 20, wherein the indicator material comprises a rare earth dopant.

27. (previously presented) The machine according to claim 26, wherein the indicator material comprises a dopant selected from the group consisting of terbium, europium, and dysprosium.

28. (previously presented) The machine according to claim 20, wherein the indicator material comprises a compositionally-graded material, a composite material, or a multi-phase material.

29. (previously presented) The machine according to claim 20, wherein the thermal barrier coating comprises a layered structure, each of the layers including an indicator material having different respective emission spectra.

30. (previously presented) The machine according to claim 20, wherein the thermal barrier coating comprises a layered structure of an outermost, substantially transparent region and a region including an indicator material optically interogatable through the substantially transparent region.

31. (previously presented) The machine according to claim 20, wherein the machine is a combustion engine.

32. (currently amended) A gas turbine engine having one or more internal components coated with a thermal barrier coating having sufficient thickness and thermal and structural properties as to form an effective barrier between the one or more components and an extreme environment such as an interior of a gas turbine engine, the thermal barrier coating comprising a mixture of at least a refractory material and an indicator material having an optical emission spectrum which varies in response to a temperature of the respective component, wherein the gas turbine engine ~~comprising~~ comprises:

a light source for directing an interrogating light beam onto the one or more components;

a light collector for collecting light from the one or more components; and

an analyzer for detecting at least a temperature of the one or more components by analysis of light collected from the one or more components.

33. (previously presented) The gas turbine engine according to claim 32, wherein the one or more components is a turbine blade.

34. (previously presented) The gas turbine engine according to claim 32, wherein the one or more components is a heat shield.

35. (currently amended) A method of detecting at least a temperature of one or more components of a machine, comprising the steps of:

providing a machine having one or more internal components coated with a thermal barrier coating having sufficient thickness and thermal and structural properties as to form an effective barrier between the one or more components and an extreme environment such as an interior of a gas turbine engine, the thermal barrier coating comprising a mixture of at least a refractory material and an indicator material having an optical emission spectrum which varies in response to a temperature of the respective component;

directing an interrogating light beam onto the one or more components;

collecting light from the one or more components; and

detecting at least a temperature of the one or more components by analysis of light collected from the one or more components.

36. (previously presented) The method according to claim 35, wherein the component is coated with one or more priming layers over which the thermal barrier coating is coated.

37. (previously presented) The method according to claim 35, wherein the indicator material has an optical emission spectrum which varies in response to at least one other physical parameter of the component.

38. (previously presented) The method according to claim 37, wherein the indicator material has an optical emission spectrum which varies in response to at least one physical parameter selected from the group consisting of a physical strain applied to at least a region of the component, erosion of at least a region of the component, and a physical stress of at least a region of the component.

39. (previously presented) The method according to claim 35, wherein the refractory material is selected from the group consisting of yttria stabilised zirconia, yttria partially stabilised zirconia, and yttria aluminium garnet.

40. (previously presented) The method according to claim 35, wherein the indicator material is a phosphor material.

41. (previously presented) The method according to claim 35, wherein the indicator material comprises a rare earth dopant.

42. (previously presented) The method according to claim 41, wherein the indicator material comprises a dopant selected from the group consisting of terbium, europium, and dysprosium.

43. (previously presented) The method according to claim 35, wherein the indicator material comprises a compositionally-graded material, a composite material, or a multi-phase material.

44. (previously presented) The method according to claim 35, wherein the thermal barrier coating comprises a layered structure, each of the layers including an indicator material having different respective emission spectra.

45. (previously presented) The method according to claim 35, wherein the thermal barrier coating comprises a layered structure of an outermost, substantially transparent region and a region including an indicator material optically interogatable through the substantially transparent region.

46. (previously presented) The method according to claim 35, wherein the component is a component of a combustion engine.

47. (currently amended) A method of detecting at least a temperature of one or more components of a gas turbine engine, comprising the steps of:

providing a gas turbine engine having one or more internal components coated with a thermal barrier coating having sufficient thickness and thermal and structural properties as to form an effective barrier between the one or more components and an extreme environment such as an interior of a gas turbine engine, the thermal barrier coating comprising a mixture of at least a refractory material and an indicator material having an optical emission spectrum which varies in response to a temperature of the respective component;

directing an interrogating light beam onto the one or more components;

collecting light from the one or more components; and

detecting at least a temperature of the one or more components by analysis of light collected from the one or more components.

48. (previously presented) The method according to claim 47, wherein the component is a turbine blade.

49. (previously presented) The method according to claim 47, wherein the component is a heat shield.